C. C. Cabinet from the Editor.

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GEOLOGY, No. 6.

Recapitulation.—The subject of my last number was the first and most important of the primary rocks, called *granite*. *Graphic granite* is a variety in which the quartz is blended with the feldspar in little veins and spots, so as to form on the fractured surface an appearance similar to Hebrew characters. Granite is very durable, and much employed for building. The Egyptian pyramids and obelisks are made of it. The scenery of granite mountains is various, sometimes heavy and rugged, and sometimes resembling masses of ruins. Occasionally the rock shoots upward to a great height in enormous spires, called *needles*, from which the *Neptunian*, or *Wernerian* geologists derive an argument in favor of the aqueous origin of the rock. Mount Blanc is the highest granite mountain yet explored. The summits of the Andes are volcanic, composed of lava, &c. Much difference of opinion prevails on the subject of the formation of this and other primary rocks, the Neptunians, with Werner at their head, ascribing them to the action of water, and the Plutonians, or followers of Hutton, attributing their origin to fire. Hot springs are brought forward in support of the latter theory. Mineral veins, supposed by Hutton to have been filled from beneath, and by Werner, from above.

Gneiss, the second of the primary rocks.—Next above granite, we find a rock composed of the same materials, but differing in the proportions and arrangement. It is called *gneiss*,—a name derived from the German. Its composition is quartz, feldspar, and mica; it contains a smaller quantity of feldspar than granite does, and the mica is distributed through it in veins or layers, imparting to the rock a slaty structure.

Mica slate, analogous to gneiss.—Next in order is a rock called *mica slate*, because it contains an excess of mica, and splits in a slaty manner. There is seldom any feldspar in this rock, its essential ingredients being quartz and mica. The quartz is in small grains, and the mica in layers, like that of the gneiss. These two rocks pass into each other, no precise line of distinction existing between them. Indeed they may be regarded as varieties of granite, to which the term *slaty granite* is applicable.

Uses of gneiss and mica slate.—Owing to their slaty and granular structure, these rocks are not so durable for buildings as granite; and, except some of the harder kinds of gneiss, which approach granite in character, they are scarcely ever used in architecture. But the facility with which they split into slabs, adapts them to other purposes. We may often observe them in pavements, as flag stones and curb stones; and they may be easily detected by the glittering scales of mica with which they are filled.

Relative position of gneiss and mica slate on mountains.—As gneiss rests upon granite, and mica slate upon gneiss, the first rock that we meet in descending a mountain, after having passed over the granite, will be gneiss, and the mica slate we shall find still lower on the side of the mountain.

Minerals and metals found in these rocks.—A number of valuable minerals are often found imbedded in the rocks I have described; such as garnets, beryl, &c. In gneiss and mica slate, the precious metals are sometimes met with in small quantities.

Primitive Limestone.—There is a kind of limestone found among the primary formations, which occurs generally in beds, or layers, of limited extent, resting commonly on mica slate. It is composed, like all other limestones, of lime in chemical union with carbonic acid. Its structure is always crystalline.

Statuary Marble.—The white variety of this rock bears a fine polish, and is much employed by sculptors; hence the name, *statuary marble*.

Origin of primitive and other limestones.—Being of the primary class, this limestone contains no vestiges of shells or animals of any kind. It is supposed, however, by some geologists, that all calcareous or limestone rocks were formed originally by shellfish; and that this particular variety once existed in the shape of great beds of sea shells on the bottom of the ocean—all traces of the shells having been subsequently obliterated by the fusion to which those beds were subjected, in consequence of the internal heat of the earth. This hypothesis is an exceedingly convenient one, precluding, by its very nature, the possibility of disproving it. But there is no reason to believe that lime cannot exist as an elementary substance, like the silex and alumine which compose granite, independent of the operations of animal life. In fact, it does so exist as a component part of many minerals which are discovered in the primary strata, and which are acknowledged to have had their origin prior to the creation of animals.

Strata formed by shellfish.—Nevertheless, it is a curious but undoubted fact, that no inconsiderable portion of the earth's surface has been formed by the labors of animals. Many of the more recent limestone strata are composed substantially of shells; and coral rocks of immense extent are even now in the progress of formation, in the Southern Ocean and in the West Indies, destined, at some remote period, to be the abodes of reptiles and quadrupeds, and finally of man.

What is the source of the lime which composes coral?—The minute animals which are so indefatigable in their work of extending the limits of the dry land, have no power of locomotion. They build their coral houses on the bed of the ocean, and live and die on the same spot. Whence then do they derive the lime which they employ? The sea water contains so small a portion of it, that we cannot suppose they derive their entire supply from this source. Perhaps, as an eminent writer has suggested, they have the faculty of producing it from its simple elements, the real nature of which chemistry may not have developed to us.

Some other primary rocks.—Besides the four principal formations that I have described, there are several other rocks, of minor importance, occurring in comparatively small beds and masses. Serpentine, hornblende, and porphyry, are among these.

The second, or transition class.—The rocks we have now considered, are supposed to have been made before the origin of plants or animals. The *transition rocks*, which I shall next introduce to your notice, appear to have been formed after an important revolution had taken place on the surface of our planet, and at a period when the earth was passing into a habitable state. They are next above those of the primary class, and are distinguished as the lowest rocks in which the relics of animals or vegetables have been discovered. They may be regarded as the most ancient geological records of our globe, imprinted with the natural history of its earliest inhabitants.

Clay slate, the deepest transition rock.—The first stratum of the transition class, is called clay slate. Some of the most useful kinds of slate belong to this species of rock. It is extensively quarried in many places for the purpose of roofing houses. In a single quarry of Scotland, 300 men are employed in this occupation. A large quantity of roofing slate is annually quarried in the state of Pennsylvania, and in other states. *Table slate*, or *writing slate*, is a compact and dark colored variety. In preparing writing slates, the material is first smoothed with an iron instrument, then ground with sandstone, and slightly polished, and finally rubbed with charcoal powder. The pencils are made of the softest variety that can be procured. Clay slate is also used in foundries, being ground and mixed with loam to form moulds for iron castings. Some varieties are made into grindstones and whetstones. We often observe tombstones constructed of clay slate.

Derivation of the name.—Clay slate takes its name from its composition, which is principally clay, or rather *alumine*, or *argilla*, the basis of clay. Another name given to it is *Argillite*.

Mines in clay slate.—In the oldest rocks we discover a small quantity only of metallic ore. As we approach those of more recent origin, the metals become more abundant. Clay slate, or argillite, is rich in ore; most of the copper and tin mines of Cornwall, and the gold and silver mines of Peru, are situated in this rock.

Scenery produced by clay slate.—Besides the influence of this stratum on human society, in consequence of its metallic riches, it also exerts a powerful effect on the nature of the soil and the scenery of the country. Thus, while the mountains of granite are rugged, barren, and uninhabitable, the hills composed of argillite are gently rounded, and exceedingly fertile.

Grauwacke, or *greywacke slate, next in order.*—Above the argillite, we meet with a slaty rock of a greyish color, composed, for the most part, of the fragments of the rocks which lie beneath. To this stratum the Germans gave the unharmonious title of *grauwack*, which has not been much improved by translation into the English name, *greywacke*.

Origin of greywacke.—The structure of this rock plainly indicates that it was formed after the older rocks had been worn down in many places by the action of the primeval ocean. For its composition exhibits nothing more than the disintegrated particles of those rocks, cemented together. This is the deepest rock in which we find fragments of other strata. S.

A Lecture on the History and Study of the Natural Sciences.

[CONCLUDED FROM PAGE 19.]

THE animal and vegetable departments are linked together by a class of substances, placed by some naturalists on the animal side, and by others, on the vegetable side of the division line. They are called *zoophytes*, or plant animals, and comprehend the sponge, coral, madrepore &c. Although a place is now commonly granted them on the scale of animal life, yet some of their varieties remain to prevent the establishment of a definite line of distinction between the two great kingdoms.

Equally diversified and interesting, though not so numerous, are the objects presented to our view in the vegetable department of nature. Here we behold the stupendous *adansonia*, or calabash tree of southern Asia, which, stretching its gigantic arms over a vast extent of soil, requires a thousand years to reach its full maturity and vigor; whilst the soft mushroom, which springs up nightly at its root, withers and dies with the morning sun. The lofty rock of Chimborazo, towering above the clouds, exhibits to us its mossy carpeting; and the dark subterranean cave supplies its frail and delicate mould, and the bed of the unfathomable ocean its profuse store of luxuriant vegetation. We observe some plants passing through all the varied stages of their existence floating on the wave, or submersed in the water—some thriving luxuriantly when suspended from a wall—some attaching themselves to a rock, to draw nourishment from the surrounding water or air. There are plants, as well as animals, adapted to extremes of temperature. The witch hazel, which blooms late in the fall, preserves its germs through the winter, unharmed by the severest frosts, to perfect their seeds in the ensuing spring and summer. On the other hand, plants have been found about a volcano in the island of Tanna, flourishing in the highest perfection when the thermometer stood at 210°; and confervas and other plants are not unfrequently traced in the boiling springs of Italy, and consequently in a temperature of 212°.

The study of botany presents itself to females in a point of view particularly engaging. The green meadow and the leafy wood, and the flower-bordered rivulet, with the gay and elegant diversity of form and color in the objects they exhibit to the inquiring eye, and the admirable perfection and symmetry, both in the individual subjects of examination, and in the general plan of their arrangement, are calculated to present peculiar charms to the delicately sensible female mind. But it too often happens that our ladies have no time to spend in this delightful pursuit. Their leisure hours are too often occupied with the works of fiction, and in the round of dissipation. In early years the youthful mind is filled, and the youthful taste depraved with the highly seasoned and stimulating food of romance; and finally the appetite gives way, and, as with the wretched dyspeptic, the noon of their lives brings them nothing to enjoy, and every thing to suffer, from the early abuse of their most exalted faculties. In this age of vitiated refinement, a "Ladies Book" is made to consist of a description of the fashionable morning dresses and evening dresses, ballroom dresses and theatre dresses—a review of the latest novels, and a chapter of Paul Clifford—an account of some newly invented steps in dancing, with sublime caricatures thereof—a history of the late fancy ball, a page of anecdotes, and another of lovesick ditties. All this, which is little less than a literal table of contents, taken from a popular periodical dedicated to the ladies—all this will go down with keen relish, and yet the fair readers have no time to devote to the study of a charming science, that will supply them with lasting food. Let them bestow on an elementary botanical work, one fourth part the time they lavish on these hollow pursuits—or one fourth of the time they are too frequently encouraged by their parents to sacrifice in acquiring a fashionable accomplishment, which often, in after life, lays the foundation of a disease that sweeps off in its fatally consuming course, thousands of the most amiable and interesting of our fellow creatures. Let parents consider these things, and they need not so often follow to the cold grave, the cherished daughters of their bosom, cut off in all the loveliness and bloom of the spring time of life. Neither would the female character be any longer liable to the reproachful imputation so often cast upon it, of devotion to shallow pursuits, to the neglect of real and substantial knowledge.

It is but justice, however, to observe, that in the northern section of our country, especially in the state of New York, much attention has of late been paid to this branch of science, by the female part of society. One of the best elementary works on botany now extant, has been recently published by Mrs. Lincoln, of Troy seminary; and we may fondly hope that the day is not far distant, when the cultivation of natural science shall supplant, what are now considered by many, the most important parts of an accomplished female education.

But I have been too long detained from the remaining division of our subject, consisting of mineralogy and geology. From the mineral kingdom are derived many of the most important and indispensable materials employed in the useful arts. To the inanimate earth we are alike indebted for the axe of the woodman, the anvil of the smith, and the chisel of the statuary—for the colossal marble and the enduring granite—the rod that lifts to heaven its glittering point, and disarms the lightning of its terrors—the coin which constitutes so useful a medium of exchange—and the coal that administers so largely to our comfort in stormy winter. Mineralogy teaches us to distinguish between objects, which to the common observer appear the same, but in reality are widely different. Not unfrequently do we find on the mantlepiece, a lump of a yellow metallic mineral, highly valued by the possessor, and exhibited as a precious morsel of gold ore; but which the eye of the mineralogist can at once detect, by its crystallized form, and other obvious properties, to be a very common and comparatively worthless combination of sulphur and iron. The glittering appearance of some micaceous rocks, has often given rise to a belief, that they contain silver ore; and on one occasion, in the early settlement of the United States, a vessel was sent from Virginia to England, laden with this supposed rich treasure, which turned out to be a rock very common in many parts of the country to which it was sent for silver ore.

More grand and imposing, though not more useful, is geology, which has for its object the position, composition and structure of the various strata composing the crust of the earth. Geology teaches that these strata preserve, throughout the circumference of our planet, a uniform situation with respect to each other. The strata, for instance, which contain coal, salt and gypsum, being always located above the primitive rocks, we may hence learn, without the labor of actual investigation, that there is neither coal, nor salt, nor gypsum, beneath the primitive trap rocks which form the palisades on the Hudson, and which compose the surface of the earth in other situations, along the course of the Schuylkill or Delaware rivers, or the Brandywine creek.

Geolgy, in connexion with the study of fossil organic remains, which are found imbedded in many of the strata, furnishes to us a history of the earth, unvarying and unerring. The order

of creation is stamped on the ever enduring rocks. We there read in characters not to be mistaken, that the lower orders of the animal world were the first that started into being. We there read, that the ferns, and reeds, and canes, were the first vegetables called into existence; and that the ancient palm was the first created fruit tree yielding fruit. There it is recorded, in characters legible to every understanding, that man was commanded into life the last of created beings. We here learn what strata were deposited from the bosom of the calm unruffled waters, and what from the devastating action of the sudden flood, or of the dashing mountain torrent. Here, we are told, whilst this stratum was forming, the ocean covered the spot with his briny waves; and here, perhaps separated from the former only by a thin bed of clay, the deposition was from an abyss of saltless water.

In the whole range of moral and physical science, there is not, perhaps, a subject better adapted than this, to excite the fancy of the student, and to allure him into speculations concerning the manner in which the work he sees before him has been performed. The moment he enters the threshold of inquiry, that moment he thinks it his duty to explain the mode in which the magnificent structure he is engaged in exploring, was arranged; and not only that, but the precise time when its different parts were erected. Hence we hardly find a single geologist of any notoriety, who has not broached his particular theory or hypothesis; which may in general be considered not the correct method of explaining the formation of the earth, but rather the method which the inventor of the system would have adopted, had he been the artificer of the Universe. Until within the two last centuries, or before the period when flourished the immortal Werner, geology was nothing more than a confused jumble of these world-making systems.

WATER SPOUTS.

Concluded from p. 21.

The following accounts will be sufficient to establish the identity of water spouts and whirlwinds:—

The terrible whirlwind which damaged a great part of Rome in June 11, 1749, was supposed to be originally a spout, as it could be traced from Ostea to Rome.

In that account the whirlwind is said to have appeared as a very black, long and lofty cloud, which was rendered visible, notwithstanding the darkness of the night, by its continually flashing or emitting lightning on all sides, rushing along with great swiftness within four or five feet of the ground.

On the 15th of August, 1687, (says Abr. de laPryme,) appeared a spout in the air, at Hatfield, in Yorkshire, about a mile off, coming directly to the place where I was. The season was very dry, and the weather extremely hot, air very cloudy, wind aloft strong, blowing from several quarters at the same time, and filling the air hereabouts with mighty thick and black clouds, layer upon layer; the wind thus blowing soon created a great vortex, gyration and whirling among the clouds, the centre of which every now and then dropped down in the shape of a thick, long, black pipe, commonly called a spout; in which I could distinctly view a motion like that of a screw, continually drawing upwards, and screwing up, as it were, whatever it touched. In its progress it moved slowly over a hedgerow and grove of young trees, which it made to bend like hazel wands, in a circular motion; then going forward to a great barn it twitched off in a minute all the thatch, and filled the whole air therewith. Coming to a great oak tree, it made it bend like the foregoing trees, and took off one of the greatest and strongest branches, that would not yield to its fury, and twisting it about, flung it to a considerable distance off; then coming to the place where I stood, within 300 yards of me, I beheld this odd phenomenon, and found it to proceed from nothing but a gyration of clouds, by contrary winds meeting in a point or centre; and where the greatest condensation or gravitation was, falling down into a pipe or great tube, something like the Cochlea Archimedis, and that in its working or whirling motion, either sucks up water, or destroys ships. Having travelled about one fourth of a mile farther, it dissolved by the prevailence of the wind that came out of the east.

June 21, 1712, pretty warm—on the afternoon of which about two o'clock, no wind stirring below, though it was somewhat great in the air, the clouds began to be mightly agitated and driven together. Whereupon they became very black, and were most visibly turned round, from whence proceeded a most audible whirling noise, like that commonly heard in a mill. After a while a long tube or spout came down from the centre of the congregated clouds, in which was a swift spiral motion, like that of a screw or Cochlea Archimedis, when it is in motion, by which spiral nature and swift turning, water ascends up into the one as well as into the other. It travelled slowly from west to north east, broke down a great oak tree or two, frightened some out of the fields, and made others lie down flat on their bellies, to save being whirled over and killed by it, as they saw many jackdaws to be, who were suddenly caught up, and carried out of sight, and one cast a great way amongst the corn; at last passed over the town of Hatfield, to the great terror of the inhabitants, filling the whole air with the thatch it plucked from some of the houses; then touching upon the corner of a church, it tore up several sheets of lead, and rolled them strongly together; soon after which it dissolved and vanished without doing further mischief.

One appeared at Topham harbor, in 1694, which passed with a slow progressive motion over land and water, acting as a complete whirlwind over the first, and a water spout over the latter. When it passed over the channel of a river, it threw up the water in a dense stream, as if it had been impelled through the bore of a fire engine; and the stream accordingly ended in a thick mist, resembling a dark smoke; the surface of the water round about the spout being greatly agitated, as usual in such phenomena. In its course it met with the hull of a new ship, of about 100 tons, which was much shaken by it, but received no hurt. In passing over the flats, it took hold of a boat fastened to an anchor, whirled both boat and anchor to some height in the air, and split the boat from head to keel. When it reached the shore, it lifted a boat about six feet from the ground, letting it fall again upside down, and had a strange effect on a parcel of planks, some of which were raised up perpendicularly, and stood on their ends while it passed along; and in its farther progress it was attended with the usual effects of whirlwinds, stripping off not only thatches, but sheets of lead, from the tops of houses, and tearing off limbs of trees.

A customary way of breaking water spouts, is by shooting them with cannon loaded with spikes and rods of iron. We must censure Neptune for instilling into the minds of his honest disciples such erroneous ideas of the character of their visiters: for sure the spikes and rods go their own way after the canon is discharged, without hurting any thing—not even a water spout. Though they tell us, immediately after the discharge, the spout breaks in two, usually about the middle, and entirely disappears, yet this is owing to the vibrations in the atmosphere, caused by the explosion, destroying its equilibrium round the spout; consequently, as the atmospheric pressure is not equal on all sides of it, that side which is the weakest must give way; thus the phenomenon ceases. The same effect is often produced by the sailors beating on the vessels' anchors with hammers and mallets. In Pliny's time they threw oil in the sea for the like purpose.

TALPA.

FROM THE PHILOSOPHICAL MAGAZINE.

Description of a Species of Natural Micrometer; with Observations on the Minuteness of Animalcula. In a Letter addressed to Sir David Brewster, *by* George Fairholme, *Esq. F.G.S.*

My dear sir—In the course of a series of microscopical observations, in which I have been of late engaged, accident has thrown in my way a species of *natural micrometer*, an account of which I now beg leave to send you. For though it may possibly not be new to one so well acquainted with every thing relating to such subjects as yourself, yet I think it worthy of description, from its having brought home to my mind the conviction of a fact in nature, which, though we are assured of its reality by numerous authors who have written on animalcula, is yet almost beyond the range of credibility, unless proved by actual demonstration.

All authors who have treated of microscopic objects, have said that there are some animalcula so inconceivably minute, that it would require *many thousands* of them to form the size of a grain of sand. Now, although we may be satisfied that the extent of created objects appears quite boundless, in whichever direction of the scale we may direct our thoughts, yet the powers of the human understanding are so much more limited, that though the tongue may *express* it, the mind fails in its attempt to *conceive* defined ideas of organized beings so much below the scale on which our common conceptions are formed.

I have not found, in any author, the mode by which he arrived at his conclusions respecting the comparative size of the two objects above named. Leuwenhoeck calculates, probably from conjecture, that the size of some animalcula is to that of a mite, as a bee is to that of a horse. I think that the following observations will demonstrate the truth of that remark; but in a manner more conclusive and convincing than mere conjecture.

In the course of last winter, having observed on a dry and frozen gravel walk a variety of small hollows, of a greenish color, it occurred to me that that tint might have been occasioned by the *scum* upon water during the summer rains; and if so, that it would probably contain animalcula. I accordingly scraped off a little of the frozen surface, and mixed it with water which had been boiled, and in which I had previously ascertained that there were no animalcula. In a few hours I examined a drop of this water, and found, as yet, no animalcula; but I discovered a number of minute transparent fibres, apparently vegetable, and to the existence of which, the green tint I had first remarked was probably owing. I found these fibres transparent; and when viewed in a certain degree of shade, I observed them to be marked throughout their whole length, in the most delicate and regular manner, with divisions like globules in a hollow tube, each of which was separated from another by a space of exactly similar dimensions. In the course of a day or two I again examined the water, and found in it a variety of animalcula, some of which were the most minute I had ever observed, except perhaps those found in an infusion of pepper. The highest powers of a good microscope gave me no information as to their form or structure, except that they were of an oval or round form, and moved about with considerable activity.

Having near me at the time some sea sand which I had been examining, I put a few grains of it into the drop, with the view of forming some idea of the comparative size of these minute creatures; and I then began for the first time to conceive the possibility of what has been stated by Leuwenhoeck and others, who have described to us the result of their observations in the minute walks of animated nature. The difference of size, however, was so great, and the angular figure of the grains of sand so rude, that I despaired of ever advancing beyond conjecture as to their actual comparative measurement.

It happened, however, that a straight piece of the above-mentioned graduated fibre lay near one of the grains of sand; and as the globules or marks in the fibre were as nearly as possible of the same size and shape as some of the animalcula swimming around, it occurred to me to use this fibre as a base on which to measure the comparative size of the two objects. I had then an exactly graduated scale for this particular calculation; and by taking the square and cubic measure of a variety of grains, of different shapes, and striking the mean of the whole, I found that instead of many *thousands* of animalcula for the size of a grain of sand, there were *from one to three millions*, necessary to make up the solid bulk. For I found the mean of ten measurements to be, 50 of the globules, which, with their 50 equal intervals, made 100 for the side of a square: the matter therefore stood thus:

$$100 \times 100 \times 100 = 1{,}000{,}000.$$

But in this calculation I had by no means taken the smallest of the animalcula discernible in the fluid. Many were much smaller than those I calculated upon; so that I had thus a simple means of proving to demonstration the existence of animated beings *from one to three millions of times less than a grain of sea sand!*

By means of a species of micrometer of my own construction, of a very simple character, but sufficiently correct for all common purposes, I consider the graduation of this natural fibre, with the intervals between the globules, to be about 6000 to an inch; and as the animalcula on which the above calculation was made were of exactly similar size and form, we thus find that the space of a common half inch die would require 27,000,000,000 of these organized beings to compose its bulk! And when we consider that others were distinctly visible in the same fluid not more than *one third part* so large, the calculation mounts far beyond the mental powers of distinct conception.

When the microscope thus discovers to us wonders in the lower part of the scale of creation as incomprehensible as those which the telescope has disclosed to us in the upper; and when we consider that we have no ground for supposing that either of these instruments has been yet brought to its highest powers, the boundless extent of the works of the Almighty is strongly presented to the mind. We thus find that all our ideas of magnitude and minuteness are merely comparative; and that when we endeavor to extend them beyond a certain point, we soon become lost in boundless obscurity, and find our views of creation terminate in *infinity* on either hand.

I inclose a small quantity of the earthy matter, in which you will find specimens of both the fibre and the animalcula. To observe the former in perfection, it may be examined very soon after being put in water; but the latter will not appear in any numbers, or with much motion, for several days. I have at present a glass containing some of the earth, which I have kept for about eight months, supplying pure boiled water as evaporation takes place. In the course of frequent examination during that period, I have found many different species of animalcula succeed each other; and I have even reason to think that different generations of the same species have been produced and have disappeared during that time.

I beg you will excuse my troubling you with details, which may possess none of the merit of novelty to you.

Yours, &c. George Fairholme.

I find the light of a lamp much superior to that of the sun for microscopical observations on transparent or very minute objects.

Rice Paper.—The fine and beautiful tissue brought from China and Calcutta, and employed under the name of *rice paper*, is far from being an artificial substance fabricated from rice or any other farinaceous material. By holding a specimen of it between the eye and a clear light, it will be seen to consist of a vegetable tissue, composed of cellules so exactly similar and so perfect, that no preparation of a paper could possibly be made to acquire.

It is now known to be made of the internal part of the ŒSCHYNOMENE *paludosa*, Roxburg,—a leguminous plant which grows abundantly on the marshy plains of Bengal, and on the borders of vast lakes between Calcutta and Hurdwart. It is a hardy plant, requiring much moisture for its perfect growth and duration. The stem rarely exceeds two inches in diameter, spreading extensively, but not rising to any great height.

The stems of this plant are brought in great quantities, in Chinese junks, from the island of Formosa and other places, to China and Calcutta. These stems are cut into the lengths intended for the leaves or sheets, and then, by means of a very sharp and well tempered knife, about ten inches long and three inches wide, the pith is divided into thin circular plates, which, being pressed, furnish the leaves sold under the name of rice paper. The operation of cutting the leaves is very similar to that of cutting corks. The leaves are generally seven or eight inches long and five wide; some are even a foot long. Those which are not fit for drawing, are colored for other purposes. Rice paper absorbs water and swells so as to present an elevation, which continues after it becomes dry, and gives to the drawing a velvety appearance and a relief, which no other kind of paper produces.

Rice paper may with care, be written upon, as the ink does not spread. The writing is glossy, shewing some metallic surfaces.

Examined chemically, it seems to be analogous to the substance which Dr. John called medulline. Treated with nitric acid, it forms oxalic acid.

The white and pure specimens are much used for drawings; the inferior are variously colored, and now extensively used in forming artificial flowers. In India, a pasteboard is made by cementing many leaves together, and of these hats are fabricated, which, covered with silk or other stuff, are firm and extremely light.

Rice paper was introduced into Europe about thirty-six years ago. The flowers which were first made of it sold at an exorbitant price. A single bouquet cost the Princess Charlotte of Wales £70 sterling.

From the quality of this paper, it may be most successfully employed in painting butterflies, flowers, birds, plants and animals. For this purpose, the object is first sketched on common paper, which is then to be pasted on a card. The sketch must be of a deep black. On this the rice paper is fastened, and the painting effected with a pencil and fine colors. When executed in this way, by the most skillful hands, the pictures of butterflies, insects, &c. have been often mistaken for the animal itself pasted on the paper. Rice paper has also been employed in lithography, with the most brilliant effect.

It is desirable, for the purposes of art, that some aquatic plant should be found in our own climate, whose pith is analogous to that of the Œschynomene. It is not impossible, also, to fabricate a paper, the tissue of which may absorb water, and furnish the relief which gives to rice paper its greatest value.—*Jour. de Connois. Usuelles, Fev.* 1832.

THE ADVOCATE OF SCIENCE.

Fifth Month 2d, 1833.

The word *than* was omitted at the beginning of the last line of the article on Water Spouts, in our last number.

We are pleased to hear again from our fair querist, and shall explain the phenomena to which she refers, in our next number, if not too much puzzled by some of her questions.

"What is the cause of the circle around the sun and moon, which is often observed when the atmosphere is slightly clouded?"

To this question of our correspondent "Barbara," we will now reply. The phenomenon referred to only takes place when the rays of light have to penetrate a thin cloud, or an atmosphere loaded with vapor. In order to comprehend the explanation, it is necessary to know what is meant by the *refraction* of light.

Put a piece of money, or any other small object, into a common bowl, and step back from it until you can no longer see the object, on account of the edge of the bowl. Then let another person pour some water into the bowl, and you will be able to see the object without changing the position of the eye.

Light, in passing out of one medium into another one more dense, or more rare, than the first, is changed in its direction, and bent out of a straight course. The light which proceeded from the piece of coin when the bowl was empty, travelled in straight lines; but as soon as the water was poured into the vessel, it became *refracted*, or bent out of a straight course, on passing from the water into the air—the water being so much more dense than air. Now, every object appears to our sight located in that direction from which the light proceeds, on entering our eye. Hence, the rays of light coming from the coin, being bent downwards before they reach the eye, elevate the apparent position of the coin, and render it visible above the edge of the bowl.

By virtue of the same law, a straight stick appears bent when one end is thrust under water. And, for the same reason, a person could not strike a fish under water, by aiming directly at it, were he to toil till his hair turns gray. The fish is not in reality where it appears to be.

In the same manner, the rays of light which proceed from the sun o moon, are acted on and refracted, in passing through a thin cloud or vapor. Most of the rays, however, are able to pass directly to the eye. But others become subject to the laws of refraction, and give rise to the circle. All the rays which strike the refracting stratum at a certain angle with the eye of the observer, converge afterwards so as to present a luminous circle. Those which strike within the circle are refracted too far to be visible, whilst those which strike without, are not enough refracted to reach the eye.

The stratum of cloud or vapor forming the circle, may be regarded as a lens, or common burning glass. The lens concentrates the rays on one spot, by virtue of the refracting power of glass compared with the atmosphere.

To the Editor of the Advocate of Science.

Since I gave you the questions on meteorology, some other questions have entered my head, which you would oblige me by answering.

1. What is the cause of the hazy or smoky state of the sky in Indian summer?
2. What is the cause of the different colors which we perceive the sun and moon to put on at different times, especially when near the horizon?
3. Why do the clouds assume such various colors after sunset?
4. Why does a red sky after sunset indicate dry weather?

Yours, etc. BARBARA.

For the Advocate of Science.

AMERICAN SCIENCE AND LITERATURE.—No. 1.

It may be very safely set down as an axiom, that the character of a nation for integrity, virtue, and power, is in direct proportion to the degree of encouragement afforded by its members to solid literature and science. And unfortunate experience has invariably taught us, that whatever appearance of disinterestedness and philanthropy individual exertions may assume, if an unrepressed and crazy ambition be the real instigator to action, the cause they espouse will not be substantially benefitted by their labors. In reviewing the intellectual taste of the American people, nothing is more evident than the error they have committed by giving encouragement to particular kinds of productions. This encouragement has extended so far that we are absolutely overstocked with what are called *literary* newspapers and *literary* journals;—their claims to the title we will not at present dispute.

If to this source we were to direct the attention of foreigners, that they might have an opportunity of judging of our capacity for intellectual enjoyment, strange indeed must be the opinion they would form of a nation, who boast so much of their enlightened republican principles, and devotion

to the cause of human improvement. But fortunately, there is not that same inconsistency manifested in our genuine votaries of science. Though we are under the necessity of complaining grievously of the general apathy of our countrymen on the first subject, yet the comparative few who feel interested in the cause, faithfully perform their duty, content with adding a few sober truths to the lore of science, without leaving in their pathway a meteor blaze, to attract the admiration of the multitude, like the infatuated genii of our land,

"Who dive for glittering pearls, and gather mud."

No person can avoid being astonished at the fact, that of more than a thousand periodicals of one kind or another which are yearly issued from the American press, not more than twenty are of a scientific character; and these few, too, have scarce sufficient encouragement to warrant their publication. A number have been suspended on this account, notwithstanding gentlemen of undoubted talents and capacity have been engaged in the editorial department. And from good and observing authority can we state, that within the last five years, a very sensible depreciation of interest in science can be observed in the citizens of Philadelphia.

It is not only of neglect to publications we complain. The scientific institutions which have appeared from time to time, have met with but little better encouragement. The first established was the American Philosophical Society; this was about one hundred years ago. Its object is to promote the advancement of the arts and sciences. This is a very general object; and it would be passing strange if it were not upheld in a handsome and respectable manner. The next founded was the Linnæan Society, which owed its existence to Dr. Benjamin Smith Barton, our well known and enterprising botanist. This was about thirty years ago. Like every other thing, it was encouraged for a time, but unlike many of insignificant value, its career was of short duration, though its object was of praiseworthy and valuable import. The Cabinet of Sciences, and Academy of Sciences, are nearly contemporaneous, the latter being established about 1812. It was soon discovered that two institutions so nearly resembling each other, could not be supported at the same time. The Cabinet of Sciences, therefore, suspended its operations, and some of its members united themselves to the Academy. A few years after, the M'Clurean Lyceum commenced operations. Its fate was no better than some of its predecessors. For the patronage afforded it was insufficient to its support. The Geological Society was instituted about a year since; of its future existence we can say nothing. But it is to be hoped, as this branch of science is gradually gaining friends, it will receive a liberal support from a wealthy community.

Thus will it be seen that of five scientific institutions which have been established in Philadelphia within the last thirty years, but two are surviving at the present time. The Academy of Sciences published its proceedings pretty regularly till the year 1825, when its members made a voluntary offering of $2000 for the purpose of purchasing a site, and erecting on it a suitable building. The property they obtained at an extremely low rate, so that what originally cost them little more than $4000, may now be valued at $10,000. Its President, Wm. M'Clure, now resident in Mexico, presented it with such a number of books, as literally forced the public to direct their attention to the institution. Thus many individuals were induced to become members, and for a time, the most flattering prospects cheered the efforts of its devoted friends. But of late years the interest of the public appears to have diminished.

Why this apathy should be manifested, to us appears strange enough, when we consider that the institution is so far beyond all pecuniary embarrassment, that, independent of its cabinets, (whichare perhaps unequalled in our country, for beauty of arrangement, and multiplicity of valuable specimens,) it possesses, in fee simple, the valuable property it now occupies. An elegant library is likewise attached to it containing about 3000 volumes, 2000 of which are of a scientific nature. Yet this apathy, as we shall hereafter show, is not inexplicable.

We cannot close this section without adverting to the efforts now making by Dr. M'Murtrie, to rouse the slumbering intellect of the people. Sincerely do we hope they may prove successful in diverting their affections to the fountain of true knowledge, and implanting a public spirit and a zeal in their hearts which will nobly redeem their character, and give a great and a lasting impulse to the progressive march of American science. Dr. M'Murtrie is about commencing another course of his lectures, to be given between the hours of 5 and 6 o'clock, P. M. It gratifies us to learn that his present course is very numerously attended. W.

JOURNAL OF THE WEATHER,

for 4th Month, April, 1833, kept at Wilmington, Del.

Days Month.	THER'M. Sunrise.	THER'M. Mid-day.	THER'M. 11 P. M.	BAROM'TER. Sunrise.	BAROM'TER. Mid-day.	BAROM'TER. 11 P. M.	WIND. Morning	Force.	WIND. Aft'noon.	Force.	WIND. Evening.	Force.	OBSERVATIONS.
1	40	66	49	29.93	29.90	29.91	S.W.	1	S.	1	0	0	Clear—hazy.
2	40	68	49	.93	.91	.31	S.	1	S.	1	0	0	Clear—hazy.
3	49	58	54	.85	.77	.70	S.E.	2	S.E.	1	S E.	0	0.75 inch. rain.
4	52	70	55	.60	.57	.55	W.	1	S.	1	S.W.	2	partly clr, .02in.r
5	52	60	44	.53	.62	.73	N.W.	3	N.W.	3	N W.	1	Partly clear.
6	37	60	45	.86	.86	.90	N.E.	2	S.E	1	S E.	0	Clear.
7	40	56	50	.95	.95	.85	S.E.	3	S.E.	2	E.	3	.50 inch. rain.
8	50	66	57	.50	.45	.50	S.	0	W.	1	N.W.	3	partly clr. .04in.r
9	50	67	56	.65	.75	.83	NW.	4	N.	4	N.E.	2	Clear.
10	48	68	56	.95	.93	.90	E.	1	S.E.	2	E.	2	Clear.
11	48	69	54	.85	.72	.50	S.E.	2	S.	3	E.	2	Clear, lightning.
12	54	70	50	.53	.23	.35	S.W.	3	N.W.	3	N.W.	5	Clear.
13	38	49	41	.55	.58	.68	N.W.	4	N.W.	4	N.W.	3	Clear.
14	34	56	48	.80	.75	.85	N.W.	3	W	2	W.	1	Clear.
15	37	52	39	30.03	30.04	30.10	E.	2	E.	2	E.	2	Cloudy, clear.
16	38	54	42	.05	.00	.00	N.E.	3	E.	3	E.	2	Cloudy.
17	42	51	48	29.93	29.88	29.94	S.	1	S.	0	0	1	2 inch rain.
18	41	64	49	.95	.97	.07	S.E.	0	S.E.	1	S.E.	1	Clear.
19	48	64	50	30.13	30.15	30.13	S.E.	2	S.	1	S W.	1	Clear.
20	48	67	52	.08	.01	29.97	S.W.	2	S.W.	1	W.	0	Clear.
21	50	70	56	29.96	29.80	.70	S.W.	2	S.W.	1	W.	0	Clear, hazy.
22	49	69	63	.73	.75	.77	S.W.	2	S.W.	2	W.	0	Clear, hazy.
23	58	74	60	.75	.45	.43	S.W.	2	S W.	3	N.	3	Cloudy, clr. hazy.
24	52	49	45	.75	.81	.94	N.E.	3	E.N.E.	3	E.	2	Cloudy.
25	40	50	43	30.00	30.00	30.00	S.W.	2	S.W.	2	S.W.	1	Cloudy, r. .15 in.
26	40	60	47	.00	.00	.05	N.	2	E.	2	S.	1	Clear, light frost.
27	40	61	46	.15	.12	.10	S.	2	S.	2	S E.	2	Clear, light frost.
28	50	62	56	.12	.09	.09	S.W.	2	S.W.	3	N.W.	1	Partly clear.
29	52	70	64	.00	.00	.00	W.	1	W.	2	W.	0	Clear, hazy.
30	54	84	66	29.90	29.70	29.85	W.	0	0	0	W.	0	Clear, hazy.

Note.—In the column representing the "Force" of the wind, 0 denotes calm, or nearly so, 1 a light breeze, 2 a breeze, 3 a wind, 4 a high wind, and 5 a very high wind.

SUMMARY.

Average at sunrise, thermometer	45°.37	—barometer	29.86	inches,	
Do. at mid-day,	do.	63°.03	do.	29.83	do.
Do. at 11 P.M.	do.	50°.80	do.	29.85	do.
Monthly mean, two obs.	do.	54°.20	do.	29.845	do.
Maximum, (30th,)	do.	84°	do. 19th	30.15	do.
Minimum, (14th)	do.	34°	do. 12th	29.23	do.
Range,	do.	50°	do.	.92	do.
Warmest day, 30th,	do.	69°			
Coldest day, 13th,	do.	43.5°			

Northerly Winds prevailed, (proportion,)	5 days	Proportion of cloudy weather,	8 days.
Easterly, do.	9 do.	Whole days clear,	14 do.
Southerly, do. (S. to W.)	16 do.	Days on which rain fell,	6 do.
Proportion of clear weather,	22 do.	Quantity of rain,	1.66 in.

Observations.—No auroras observed. Clouds electrified in the western horizon twice. Not a single complete easterly storm with rain, throughout the month, although frequent threats. On the 24th there was a "dry" easterly storm. This month was remarkable for want of rain, especially the last three weeks. Vegetation suffers on this account. On the morning of the 14th, ice was observed in many places, and so late as the 26th and 27th, there were partial frosts. But the fruit does not appear injured. The two last days of the month were remarkably warm, especially the 30th. In the corresponding month of last year, the thermometer was not above 73°, and even in the fifth month it was not higher than 76°. Indeed, a temperature of 84° is almost unprecedented so early in the spring.

To the Editor of the Advocate of Science.

If the following dialogue appears worthy of a place in your paper, it is at your disposal. The characters chosen are such as we often meet with in every-day life—a parent desirous to inspire his children with a love of useful knowledge—a son who is already sensible of the enjoyment derived from the pursuits of science—and another who has never opened his eyes on nature, but whose taste and inclinations have been formed by the excellent writings of Moore, Byron, Scott, Cooper, &c. In naming my heroes, I have not resorted to the classics, nor to the works of romance; but have selected brief and common appellations. Q.

A SCIENTIFIC WALK, AND A SCIENTIFIC CONVERSATION.

Father. Come, my boys, let us take a walk along the bank of the creek. The flowers are just beginning to bloom, and I have no doubt we shall find some materials for entertaining and rational reflection.

Louis. That is a very dry walk, father; there is not a spice of romance about it. If one don't take care he'll get eat up with spiders and flies.

Father. You remind me, my son, of the chapter you used to read at school, called "Eyes and no Eyes, or the art of seeing." If you indulge that fanciful disposition of yours much longer, you will suffer for it all your life. It is time for you to use your eyes, and to think of what you see.

John. Come along, Louis; pocket "The Young Duke," and bear us company.

Louis. Well—to accommodate you, I submit. But to me it seems a curious taste—a kind of derangement, to be forever catching bugs and flies, and hunting up insignificant weeds. I've no idea of being a Dr. Battius.

Father. There are bounds to be observed in all pursuits, and some persons are, no doubt, too much devoted to particular branches of science. But I am sorry to hear a child of mine speak in that way of the employment of the naturalist. It displays a degree of ignorance not compensated for by a disposition to learn and to inquire. For once in your life, my son, look about you and try to find something to reflect on.

Louis. Stay, father, there is John scratching in the wood pile, and discussing science with the wood cutter. I am curious to know what he has found. John, have you caught any wood lice there?

John. No; but I have ascertained the age of this oak log. It is scarcely thicker than my body, and yet was 35 years reaching its growth.

Louis. Pray, how have you made that discovery, brother Mentor?

John. By counting the rings or circles which you see on this sawed end. Every circle answers to a year's growth.

Louis. I should like better authority on such a point.

Father. John is correct. During the summer, while a tree is growing, a layer of soft wood is thrown out all round the trunk, inside of the bark; and this hardens during the winter, and forms a distinct circle. The age of a tree, in northern latitudes, may be ascertained in this way with absolute certainty. But in tropical climates, it is more difficult, because the process of growth is almost continually going on. Linnæus counted 300 of these circles in an European oak, and 400 years have been observed marked in this way on a tree of the pine species.

Louis. Really, that is curious, and worth knowing. But I observe the circles of wood are uniformly thicker on one side of the trunk than on the other. John, can you explain that?

John. I never saw that before, and I can't explain it, unless the soil was more fertile on one side of the tree than on the other.

Father. That is not the correct solution, although such a cause may possibly have some effect. The true explanation is, that the tree grows faster on the side next the sun, and hence the layers of wood are thicker on that side.

Louis. Here then is a stick of wood which I have found, exactly as old as myself, and which grew just in this position.

Father. Exactly so.—See those swallows how they dart along close to the water. Can you explain that, Louis?

Louis. To be sure I can. It is a sign of rain.

John. But that is not the cause of it. I have heard it remarked that they fly near the earth because there are many insects there just before a rain; and that swallows feed on these insects.

Father. That is the mode of accounting for it. Here is another indication of rain—the moisture has collected like dew on those stones. Can you account for that, John?

John. I suppose it is owing to the great quantity of moisture in the air, condensing on the cold stones.

Father. True—just as you see the water collecting on the outside of a glass of cold water in warm weather. Some stones are, on this account, very good weather prophets.

John. I suppose such stones may be called *Hygrometers*, on account of their property of denoting an excess of moisture in the air.

Father. Yes, they are certainly *Hygrometers*, although the instruments so named are most commonly made of a cord or hair, which contracts in proportion to the quantity of moisture in the atmosphere; and by contracting moves the index of the instrument.

John. I have often observed the clothesline in our yard to stretch itself tight in wet weather, while in dry weather it hangs very loosely.

Father. The clothesline answers the purpose of a hygrometer in that case. There are few fabrics of cotton or linen not sensibly affected by changes of the atmosphere, which the eye is unable to detect.—What have you found to laugh at, Louis?

Louis. A ludicrous idea struck me. I have a pair of pantaloons that are never of the same length for two successive days, but are continually elongating themselves beneath my feet, or contracting in an unseemly manner. But the cause never occurred to me before. I shall now be able to predict rain by noticing whenever my hygrometrical pantaloons require adjustment!

John. Good! my brother will be a philosopher yet.—I have been perplexing myself since we left the wood cutter, to account for the numerous pencils of rays which appeared awhile ago in the west, emanating from the sun. The woodman remarked that he was hurrying to finish his work before the rain came on, which he said would soon happen, because the sun was "drawing water" in the west.

Father. The idea of the sun "drawing water," is common with the vulgar, but I hope you have succeeded in finding a more philosophical explanation of the phenomenon.

John. It appears to me that it is owing to the rays of the sun illuminating that portion of the hazy or vaporous atmosphere through which they pass. I have often witnessed an analogous effect produced by the light of a candle shining from a window in a foggy night. The apertures of the clouds may be compared to windows, which transmit the rays of the sun.

Father. A very good explanation. But I perceive we must speedily retrace our steps, else the rain will overtake us. Our walk along the creek must be deferred to another day.

Louis. What a pity! I was just becoming interested in our conversation, and hoped to discover other subjects of entertainment in the course of our walk. But I had no idea that science was so simple and plain a thing as it would appear from what has been said. It was all very intelligible to me, though I am a mere novice.

Father. In every branch of science there are subjects simple and easily explained, yet useful and entertaining. So far as our conversation has extended to-day, it can hardly be considered scientific; we have discoursed only on a few common-place topics. He who never observes, nor cares to inquire into the simple phenomena which intrude every day upon his notice, makes but a pitiful use of his senses, and intellectual faculties. In neglecting to exercise the gifts of his Creator, he neglects the giver. And he deprives himself of one of the richest sources of innocent and rational enjoyment. The character of the man whose life is devoted to the gratification of his sensual inclinations, and who neglects the cultivation of his mind, is not enviable—it is debased, degraded. Such a man is in reality a brute. Let me hope better things of my children. Let them act as if they could see as well as feel,—as if they could reflect as well as fancy,—as if they had intellectual faculties as well as passions and animal appetites.

MISCELLANIES.

1. *Artificial Granite.* Take two ounces of very pure white glass, an ounce of glass of antimony, a grain of the powder of cassius, and a grain of manganese; reduce the whole to powder, mix intimately, and melt in a crucible. The product has such a resemblance to granite that many persons mistake it for that substance.—*Jour. de Con. Us.*

A friend suggests the facility and advantage of introducing this article into use, in the construction of table slabs, and other household furniture, usually formed of marble. Its cheapness and beauty when polished are two excellent arguments in its favor.

2. *Salt in Brazil.*—Notwithstanding this indispensable article to animal life might be obtained abundantly from the sea water, yet a quantity sufficient to cure an ox costs more than three times the sum usually given for that animal; individuals are prohibited from selling it lest the monopoly of a company should be injured.

3. *Depth of oceans &c.*—The depth of the Mediterranean sea has been ascertained to vary from two or three hundred, to 2000 yards. At the narrowest part of the straits of Gibraltar, where they are nine miles broad the depth is about 1000 yards. The greatest depth of the Adriatic is less than fifty yards. The mean depth of the Atlantic Ocean has been estimated at three miles, and that of the Pacific at four miles. It was the opinion of La Place that the depth of the sea is inconsiderable; and that its mean depth is of the same order as the mean height of continents and islands above its level. But as high mountains are spread over some parts of the continents, so there may be great cavities in the bottom of the sea.

4. *Traditions of ancient nations similar to the Mosaic history.*—The ancient Etruscans had a tradition that God had employed 12000 years in the work of the creation. In the first period of one thousand years, he had made the heaven and the earth; in the second, the firmament, which he called heaven; in the third, the sea, and all the waters on the earth; in the fourth the sun, moon and stars; in the fifth, birds, and reptiles, fish and quadrupeds; and in the sixth, the human race. They also taught that being so formed at the termination of 6000 years, mankind would last 6000 years, when there would be a consummation of the whole world at the end of the 12000 years. —*Turner's Hist. of the world.*

5. *Faculty of Aquisitiveness developed in the monkey.*—The monkeys in Exeter change were confined in a line of narrow cages, each of which had a pan in the centre of its front for its food. But when they were all supplied, scarcely any ate out of his own pan, but thrust his arm through the bars to rob his left or right hand neighbor, though his own pan was exposed meanwhile to similar depredations.—*Ibid.*

6. *Importance of the sense of touch.*—Buffon thought touch of so much importance that one man had little more ability than another only as he had made better use of his hands. Such a notion would be apt to discourage an individual who had lost his hands, seeing that he might almost as well be headless as without fingers!

7. *Valuable material for walks and alleys.*—A soap maker, not knowing what to do with the black sulphurous residuum of his ley tubs, spread it in a wet state along the alleys of his garden. It soon became stiff and almost impervious to rain; the alleys were always dry; no grass or weeds appeared on it, but the plants within a few inches of it all died: he was delighted with this discovery of the means of enjoying clean and dry walks without any trouble, having only to put a covering of clean sand over the refuse. Having occasion some time after to repave his yard, he used the soft refuse instead of mortar. It soon hardened and cemented the stones so well, that the heaviest carriages occasioned no disadjustment.—*Jour. de Con. Us.*

8. *Expansion of water in freezing.*—Every body knows that water expands in the act of freezing, so as to burst a tub or vessel containing it. Experiments were once made by some European academicians, tending to show that a globule of water one inch in diameter is capable of exerting an expansive force in freezing equal to twelve tons. In crystallizing to form ice, the particles of water assume a particular position relative to each other, which position does not suffer them to pack together as closely as in the fluid state; and hence the expansion.

9. *What is the most natural articulate sound?*—According to Rees' Cyclopedia, the letter A is the first letter of every alphabet, except the Ethiopian, in which it is the thirteenth. This probably arises from its being the most natural sound. Children have less difficulty in pronouncing it, and it occurs in many of the first words which they utter, such as *mama, papa, dada.* Even in the crying of an infant, the sound of the letter is perceptible.

10. *Growth of Rocks.*—It has been observed that characters and names which had been a long time cut in the limestone of the grotto of Antiparos, projected from the surface on which they were inscribed. From this circumstance, Tournefort was induced to believe, that rocks increase in size. But the projection referred to, was probably owing to the deposition of lime from the lime water which exuded from the cuts.

11. *Voluntary power of the stomach.*—Darwin relates a curious story of a man whose stomach had acquired such a faculty of distinguishing one substance from another, that he could swallow a pint of red rough skinned gooseberries, and a pint of white smooth ones, and then bring up whatever kind of the two was asked for. If the account be correct, the stomach of the man must have possessed the sense of touch as the mouth does. Moreover, it must have been larger than our own.

12. *A pet toad.*—Toads are very apt to take up their abode near the kitchen door, and profit by the crumbs which are shaken daily from the tablecloth. We have repeatedly seen several of them march out regularly every evening after tea, from beneath the steps of the kitchen door, on this errand. In Turner's History, (Family Library,) a short biography is given of one of these despised reptiles, which made its home in such a spot, and appeared to have reached the years of maturity when first noticed. It came forth from its hole every evening, immediately on observing the candle, waiting deliberately to be lifted up and carried to a table in the house, where it was fed with insects, flies, and millepedes. It was particularly fond of maggots, and small worms. It watched these with great eagerness, and having measured the distance with its eyes, it darted out its long tongue, which brought back the animal to it. It lived 36 years thus domesticated when a hungry and barbarous raven flew at it and destroyed one of its eyes.

13. *Stucco for walls.*—In Italy, great use is made of a stucco which gives to walls the brilliancy, the cleanliness, and almost the hardness of marble. It may be variously colored, to suit the taste of the employer. This stucco is made very easily, by mixing lime and pulverized marble, in nearly equal proportions, according to the meagreness or richness of the marble. A paste or mortar is made of this mixture. and applied to the wall in the thickness of a five franc piece, with a trowel wet with soap suds, and in such a way that the whole of the wall may be finished in the same day. None but mineral colors should be mixed with the stucco, as the lime would destroy those derived from the vegetable kingdom. To obtain the greatest brilliancy, the mortar should be applied with a cold trowel. Workmen, for the sake of ease and expedition, usually employ it warm. Chips and fragments of marble may be advantageously employed for this purpose. In cases where the appearance of a marbled wall would be objectionable on account of its coldness any portion of it may be covered with paper.—*Jour. de Con. Us.*

14. *The Cotton plant*—Gossypium *herbaceum.*—This plant, like many others, has a great tendency to impoverish the soil on which it grows. An expeditious way of renewing the land, as frequently practiced in Arkansas, is by thrashing the herb to pieces in the field, cutting it by means of a loaded harrow or roller armed with knives, and ploughing it in. In addition to the plant itself, the seed imparts considerable nourishment to the soil, being very oleaginous, and constituting three fourths of the crop in weight; this appears by the experiment of applying it to the maize, which grows as luxuriant as when treated with gypsum, when thus managed. When scalded and mixed with a little salt, the seed also forms a palatable and nourishing food for cattle. The cotton which grows in China, of which Nankeen is made, is tinged with a red in its vegetable state; this is supposed to be the cause of its washing so much better than that we manufacture. The seeds of this are used as food by the inhabitants where it is cultivated.

15. *Use of the thermometer in detecting sand banks.*—Humboldt ascertained the fact of the rapid fall of the temperature of the sea water, on approaching a sand bank. The thermometer on and near the bank was from 54° to 55.5°, while in deep water it ranged from 59° to 59.5°, the air being 55°. This is of great importance to navigators, and perhaps a succession of experiments might give rise to data from which the presence of shoals might be detected with much more ease and quite as much certainty as they now are with the lead.

16. *African negroes.*—Sensual gratification is the paragon of barbarian happiness. A native of Africa, servant of captain Landers while exploring the Niger, discovering by some means or other and in spite of his Æsculapian ignorance, that bitter substances were excellent tonics, cribbed all the galls of the quadruped race he could come across and devoured them with the greatest avidity, that he might be enabled to eat a greater quantity of food at his regular meals.

AGENTS.

Mount Holly, N. J.—*Samuel Bullock.*
Morrisville P. O. Pa.—*Hector C. Ivans.*
Pottsville, Pa.—*Elihu Pedrick.*
Darby, Pa.—*John Sellers Jr.*
Baltimore, Md.—*Joseph Earnest, N.E. corner of Eutaw Street and Carpenter Alley.*
Alexandria, D. C.—*Henry Stabler.*
Washington, D. C.—*William Ellison.*